

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS:

1. (Currently Amended) A data processing apparatus for selecting one of a plurality of candidate data corresponding to watermark data embedded into object data to embed the selected one candidate data as said watermark data without prior categorization of data to be embedded with said watermark data, comprising:

object processing apparatus for dividing input data into a plurality of object blocks distributed in a spatial domain, each object block comprising an array of pixels, and using the object blocks as said object data for embedding;

a variation indication data generation means for generating a plurality of variation indication data indicating variation between said object data and each of the object data obtained by embedding each of said plurality of candidate data, each of said plurality of candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation means for generating a plurality of detectability indication data, each indicating the detectability of each of said plurality of candidate data;

a watermark data selection means for selecting one of said candidate data based on said plurality of variation indication data and said plurality of detectability indication data; and

a data embedding means for embedding the selected candidate data into said object data as said watermark data, wherein said embedding is performed in said spatial domain.

2. (Currently Amended) An image processing apparatus for selecting one of a plurality of candidate data corresponding to watermark data embedded into image data to embed the selected candidate data into said image data as said watermark data without prior categorization of said image data, comprising:

image processing apparatus for dividing input data into a plurality of object blocks, each object block spatially distributed throughout an image and comprising an array of pixels, and using the object blocks as said image data for embedding;

a variation indication data generation means for generating a plurality of variation indication data indicating variation between said image data and each of the image data obtained by embedding each of said plurality of candidate data, each of said plurality of candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation means for generating detectability indication data, each indicating the detectability of each of zero or more candidate data;

a candidate data selection means, for employing said detectability indication data to select one of said candidate data that corresponds to variation indication data for variations that are smaller than a predetermined reference; and

a data embedding means for embedding the selected candidate data as said watermark data in said image data, wherein said embedding is performed in a spatial domain.

3. (Original) The image processing apparatus according to claim 2, wherein said detectability indication data generation means generates detectability indication data indicating the

detectability of said candidate data corresponding to said variation indication data indicating variations smaller than said predetermined reference.

4. (Original) The image processing apparatus according to claim 2, wherein, when no candidate data corresponding to said variation indication data for variations smaller than said predetermined reference exists, said candidate data selection means selects predetermined supplement data, instead of said candidate data.

5. (Previously Presented) The image processing apparatus according to claim 2, wherein each of said object image data is each of a plurality of image blocks obtained by dividing one image data set, and

wherein each of said watermark data corresponding to each of said object image data includes one or more types of constituent data constituting additional information that is added to said object image data,

said image processing apparatus further comprising:

a watermark data correspondence means for corresponding said constituent data constituting said additional information data with said plurality of image blocks, as said watermark data; and

a candidate data generation means for generating said plurality of candidate data corresponding to said constituent data corresponding with said plurality of image blocks.

6. (Original) The image processing apparatus according to claim 5, wherein said watermark data correspondence means accepts predetermined key data to correspond said constituent

data of said additional information data with said plurality of image blocks based on said predetermined key data.

7. (Original) The image processing apparatus according to claim 5, wherein said candidate data generation means generates, as said plurality of candidate data, a plurality of additional patterns employing the same configuration as said object image data to be added to said object image data.

8. (Previously Presented) The image processing apparatus according to claim 7, wherein said candidate data generation means generates said plurality of additional patterns by multiplying a plurality of predetermined coefficients with basic patterns corresponding to said constituent data of said image blocks.

9. (Previously Presented) The image processing apparatus according to claim 8,

wherein said detectability indication data generation means calculates said detectability indication data representing a correlation between said additional patterns and said basic patterns; and

wherein said candidate data selection means selects, from among said additional patterns, a pattern corresponding to detectability indication data representing the highest correlation,

said image processing apparatus further comprising:

a watermark data detection means for detecting said watermark data embedded into said image block, based on said correlation of said basic patterns and an image block into which the selected additional pattern is embedded.

10. (Previously Presented) The image processing apparatus according to claim 5, wherein said watermark data correspondence means sorts said plurality of image blocks into one or more groups, each of which including one or more of said image blocks to correspond said constituent data with said image blocks that are included in said groups.

11. (Previously Presented) The image processing apparatus according to claim 2, wherein said variation indication data generation means calculates each differences between each entropy values for said object image data and each entropy values for said object image data obtained by embedding each of said plurality of candidate data as said variation indication data.

12. (Original) The image processing apparatus according to claim 2, wherein said detectability indication data generation means generates said detectability indication data for said respective candidate data corresponding to said variation indication data with their values within a predetermined range.

13. (Currently Amended) A data processing method for selecting one of a plurality of candidate data corresponding to watermark data embedded into object data for embedding the selected candidate data as said watermark data without prior categorization of data to be embedded with said watermark data, comprising:

object processing including dividing input data into a plurality of object blocks distributed in a spatial domain, each object block comprising an array of pixels, and using the object blocks as said object data for embedding;

a variation indication data generation step of generating a plurality of variation indication data indicating variation between said object data and each of the object data obtained by embedding each of said plurality of candidate data, each of said plurality of candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation step of generating a plurality of detectability indication data, each indicating the detectability of each of said plurality of candidate data;

a watermark data selection step of selecting one of said candidate data based on said plurality of variation indication data and said plurality of detectability indication data; and

a data embedding step of embedding the selected candidate data into said object data as said watermark data, wherein said embedding is performed in said spatial domain.

14. (Currently Amended) An image processing method, for selecting one of a plurality of candidate data corresponding to watermark data embedded into image data for embedding the selected candidate data into said image data as said watermark data without prior categorization of said image data, comprising:

image processing including dividing input image data into a plurality of image blocks, each image block spatially distributed throughout an image and comprising an array of pixels, and using the image blocks as said image data for embedding;

a variation indication data generation step of generating a plurality of variation indication data indicating variation between said image data and each of the image data obtained by embedding each of said plurality of candidate data, each of said plurality of

candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation step of generating detectability indication data, each indicating the detectability of each of zero or more candidate data;

a candidate data selection step of employing said detectability indication data to select one of said candidate data that corresponds to variation indication data for variations that are smaller than a predetermined reference; and

a data embedding step of embedding the selected candidate data as said watermark data in said image data, wherein said embedding is performed in a spatial domain.

15. (Currently Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method steps for selecting one of a plurality of candidate data corresponding to watermark data embedded into object data to embed the selected candidate data as said watermark data without prior categorization of data to be embedded with said watermark data, said method steps comprising:

object processing including dividing input data into a plurality of object blocks distributed in a spatial domain, each object block comprising an array of pixels, and using the object blocks as said object data for embedding;

a variation indication data generation step of generating a plurality of variation indication data indicating variation between said object data and each of the object data obtained by embedding each of said plurality of candidate data, each of said plurality of

candidate data comprised of a different block pattern having pixel element values adjusted from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation step of generating a plurality of detectability indication data, each indicating the detectability of each of said plurality of candidate data;

a watermark data selection step of selecting one of said candidate data based on said plurality of variation indication data and said plurality of detectability indication data; and

a data embedding step of embedding the selected candidate data into said object data as said watermark data, wherein said embedding is performed in said spatial domain.

16. (Currently Amended) A program storage device readable by a machine, tangibly embodying a program of instructions executable by the machine to perform the method steps for selecting one of a plurality of candidate data corresponding to watermark data embedded into image data to embed the selected candidate data as said watermark data without prior categorization of said image data, said method steps comprising:

image processing including dividing input image data into a plurality of image blocks, each image block spatially distributed throughout an image and comprising an array of pixels, and using the image blocks as said image data for embedding;

a variation indication data generation step of generating a plurality of variation indication data indicating variation between said image data and each of the image data obtained by embedding each of said plurality of candidate data, each of said plurality of candidate data comprised of a different block pattern having pixel element values adjusted

from a selected basic pattern associated with an individual object block and having a same structure as said object block;

a detectability indication data generation step of generating detectability indication data, each indicating the detectability of each of zero or more candidate data;

a candidate data selection step of employing said detectability indication data to select one of said candidate data that corresponds to variation indication data for variations that are smaller than a predetermined reference; and

a data embedding step of embedding the selected candidate data as said watermark data in said image data, wherein said embedding is performed in a spatial domain.

17. (Previously Presented) The program storage device according to claim 16, wherein said detectability indication data generation step generating detectability indication data that indicate the detectability of said candidate data corresponding to said variation indication data indicating variations smaller than said predetermined reference.

18. (Previously Presented) The program storage device according to claim 16, wherein, when no candidate data corresponding to said variation indication data for variations smaller than said predetermined reference exists, instead of said candidate data, said candidate data selection step selects predetermined supplement data.

19. (Previously Presented) The program storage device according to claim 16,
wherein each of said object image data includes a plurality of image blocks obtained by dividing one image data set;

wherein each of said watermark data corresponding to each of said object image data includes one or more types of constituent data constituting additional information that is added to said object image data; and

wherein said computer-readable program further comprises

a watermark data correspondence step of corresponding said constituent data constituting said additional information data with said plurality of image blocks, as said watermark data, and

a candidate data generation step of generating said plurality of candidate data corresponding to said constituent data corresponding with said plurality of image blocks.

20. (Previously Presented) The program storage device according to claim 19,

wherein said watermark data correspondence step includes accepting predetermined key data to correspond said constituent data of said additional information data with said plurality of image blocks based on said predetermined key data.

21. (Previously Presented) The program storage device according to claim 19,

wherein said candidate data generation step generates a plurality of additional patterns employing the same configuration as said object image data to be added to said object image data as said plurality of candidate data.

22. (Previously Presented) The program storage device according to claim 21,

wherein said detectability indication data generation step calculates said detectability indication data representing a correlation between said additional patterns and said basic patterns;

wherein said candidate data selection step selects a pattern corresponding to detectability indication data representing the highest correlation among said additional patterns; and

wherein said computer-readable program further comprises
a watermark data detection step of detecting said watermark data embedded into said image block, said correlation of said basic patterns and an image block into which the selected additional pattern is embedded.

23. (Previously Presented) The program storage device according to claim 22 wherein said detectability indication data generation step calculates the products of said additional patterns, and corresponding data that are included in said basic patterns, that correspond to said additional pattern are calculated as said detectability indication data; and wherein said candidate data selection step selects said candidate data that correspond to the detectability indication data of a maximum value.

24. (Previously Presented) The program storage device according to claim 19, wherein said watermark data correspondence step sorts said plurality of image blocks into one or more groups, each of which including one or more of said image blocks to correspond said constituent data are corresponded with said image blocks that are included in said groups.

25. (Previously Presented) The program storage device according to claim 16, wherein said variation indication data generation step calculates each of differences between each of entropy values for said object image data and each of entropy values for said object image

data obtained by embedding each of said plurality of candidate data as said variation indication data.

26. (Previously Presented) The program storage device according to claim 16, wherein said detectability indication data generation step generates said detectability indication data for said respective candidate data corresponding to said variation indication data with their values within a predetermined range.